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CLINICAL HYPOTHESES

Luo Vessels (Collaterals): A New Perspective

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Abstract: The authors offer a new perspective on the trajectory, function and pathology of the Luo vessels (collaterals): (a) Every Luo vessel is comprised of two branches: one proceeds proximally from the Luo point, and the second proceeds distally; (b) the interrelation between the vascular system and Luo vessels is elaborated; (c) syndromes characterized as Excess correspond to vascular (arterial or venous) pathology; (d) Deficiency syndromes correspond with disorders involving microcirculation, or innervation of different tissues. Included are various criteria for differentiation and recommendations for the consideration of Luo vessels in treatment.

THE theory of channels and collaterals (Jing-Luo) is one of the most ancient and fundamental concepts of Chinese acupuncture; it continues to intrigue and challenge modern acupuncturists.

I. Theoretic Considerations

According to Jing-Luo theory, the Luo vessels are secondary pathways that branch

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off from their related Primary channels (see Figure 1). There are 15 Luo vessels, including the 12 Luo that branch from each of the twelve Primary channels, the Ren and Du Extra vessels, and the Great Luo of the Spleen.¹⁻⁵

These Luo vessels are distributed superficially over the four limbs, head, and the anterior, posterior and lateral aspects of the body. They primarily connect the channels of the yin-yang (internal-external) related organ pairs, protect and strengthen the function of the twelve Primary channels, and also assist the transportation and distribution of Qi and Blood, which moisten and nourish the whole body.¹⁻⁵ Functioning also as a type of safety valve, the Luo vessels provide a means by which an excess of energy in one channel may be "drained off" into, or a relative deficit may be "replenished" from, its paired organ.⁶

However, the traditional descriptions of the trajectory, function and pathology of the Luo vessels raise many questions, and therefore may prevent their effective appli-

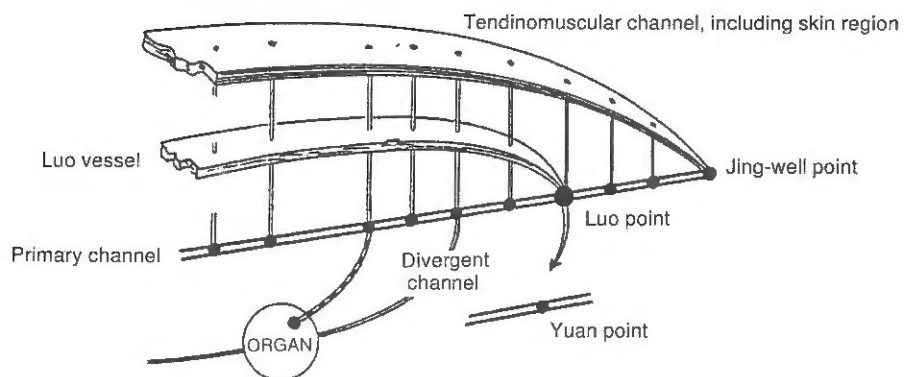


Figure 1.
Conventional representation of a Primary channel and its corresponding
Luo vessel, Tendinomuscular and Divergent channels

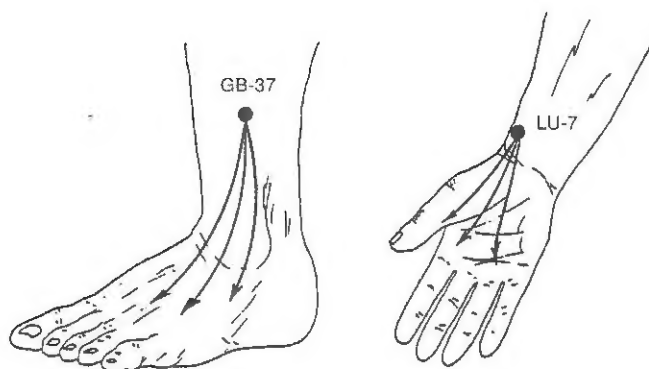


Figure 2.
Conventional representation of the paths of the Luo vessels of
the Gallbladder and Lung vessels

cation in clinical practice. Consider, for example:

1. According to the conventional understanding, why do the paths of the Luo vessels of the Lung and Gallbladder proceed distally, whereas the Luo of other channels proceed proximally? (see Figure 2)
2. Why is it that clinical manifestations may not directly relate to the pathway of the local Luo vessel?
3. Why, for example, does Excess of the Lung Luo manifest "heat in the wrist or palm," whereas Excess of the Gallbladder Luo manifests "coldness in the feet"?
4. How can the same clinical manifestations (pain, pruritus, etc.) be differentiated in disorders of the Primary, Tendinomuscular, and Luo vessels?

This article will attempt to offer a new perspective regarding different aspects of the Luo vessels that may help to answer unresolved questions and assist in their practical use.

A. New Perspective on Trajectories of the Luo Vessels

We contend that every Luo vessel is comprised of at least two branches, each originating at the related Luo point. One branch proceeds along the proximal portion of the Primary channel, and the second branch proceeds distally along the distal portion of the Primary channel.

Therefore, while the deep pathway of a Divergent channel⁷ is very similar to the deep pathway of its related Primary channel, the pathway of a Luo vessel is longer and traverses the full length of the pathway of its related Primary channels.

The Ling Shu (chapter 66) characterizes the yang Luo vessels as "opening" to the ex-

terior, but yin Luo vessels "opening" to the interior.² Very likely, this statement is correct for the proximal branch of the Luo. According to our working hypothesis, the converse would be the case for the distal branch, i.e., yang Luo vessels "opening" to the interior and yin Luo vessels "opening" to the exterior.

We propose that Luo points are:

- a. The location where a Luo vessel crosses a yang Primary channel from a proximal superficial level to a distal deeper level; and
- b. Where a Luo crosses a yin Primary channel from a proximal deeper level to a distal superficial level (see Figure 3). In this manner, the Luo vessels proceed along the entire pathway of the Primary channel.

The question arises: Why would only one branch, the proximal, have been described in traditional sources? Possibly, because the proximal branch was damaged more frequently, or because the trajectory of this branch was not clearly distinguished from the trajectory of the Primary channel. Considering this, it would be understandable why clinical manifestations may sometimes not clearly relate to the trajectory usually described for that Luo vessel.

B. Clinical Manifestations: Syndromes of Excess and Deficiency

As described above, the Luo vessels strengthen the relation between each pair of yin-yang (internal-external) related channels as well as transport Qi and Blood to various tissues and organs of the human body.¹⁻⁵ Disorders of the Luo vessels consist of symptoms corresponding to blockages of Qi and Blood. Some symptoms can be differentiated as Excess or Deficiency, but others can indicate a blockage of a specific Luo vessel. For example, blockage of the

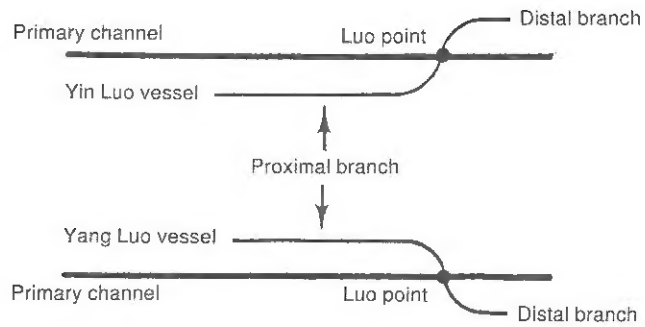


Figure 3.

Proposed representation of the proximal and distal branches of Yin and Yang Luo vessels

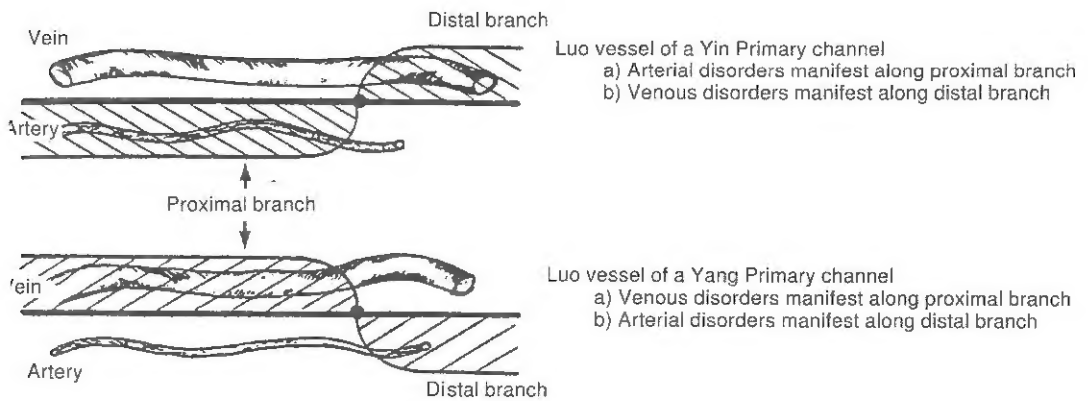


Figure 4.

Areas of influence of the proximal and distal branches of Yin and Yang Luo vessels and their correspondence to the vascular system

Table 1.
Syndromes of Excess Luo Vessels (Collaterals)

Collateral	Proximal Branches	Distal Branches
Yang	Venous disorders	Arterial disorders
Yin	Arterial disorders	Venous disorders

Spleen Luo manifests "cholera" with vomiting and diarrhea; however, Excess of the Spleen Luo manifests severe abdominal pain, and Deficiency manifests fullness in the abdomen "like a drum."¹⁻⁵

We will analyze Excess and Deficiency from the perspectives of physiologic function, specifically, the general and local adaptation syndromes.

In order to survive, when an organism encounters any adverse factor that disturbs its homeostasis, the organism initiates what Canadian physiologist Hans Selye termed the "general adaptation syndrome" (GAS).⁸⁻¹⁰ The GAS involves vasoregulatory and endocrine mechanisms. Selye described three phases of adaptation: (1) alarm, (2) resistance, (3) exhaustion.

In order for successful adaptation to proceed, activation of the sympathetic nervous system (SNS) must be greater than activation of the parasympathetic nervous system (PNS). These two divisions of the autonomic nervous system function as paired antagonists.

The *resistance phase* usually presents without clinical manifestations. However, the various symptoms manifested in the *alarm phase* are characterized primarily by an increase of SNS activity, with high blood levels of hormones, including corticoids, etc. The *exhaustion phase* is characterized by a decrease of PNS activity and lower levels of some hormones, including insulin.^{8,9}

The alarm phase is very active and corresponds to the Chinese concept of an Ex-

cess syndrome. The exhaustion phase manifests low energy and corresponds to a Deficiency syndrome.

Whereas the general adaptation syndrome is a response of the organism as a whole, the local adaptation syndrome is the response of a specific organ, tissue or cells and involves principles similar to the GAS.

C. Excess Syndromes of the Luo Vessels

According to Jing-Luo theory, Luo vessels transport Qi and Blood, which may be in Excess or Deficiency. Within the region of these Luo vessels, the vascular anatomy includes veins that are distributed superficial to arteries. Our observations have led us to propose that in the presence of an Excess syndrome and high SNS activity, vascular pathology may be present. Specifically, we suggest the following schema of four possibilities: (see Figure 4 and Table 1):

1. Excess syndromes of the proximal branches of a Yang Luo involve venous disorders;
2. Excess syndromes of the distal branches of a Yang Luo involve arterial disorders.
3. Excess syndromes of the proximal branches of a Yin Luo involve arterial disorders;
4. Excess syndromes of the distal branches of a Yin Luo involve venous disorders.

For example, in addition to the classical indications of Excess at the *proximal* branch of the Stomach Luo (Yang) including "men-

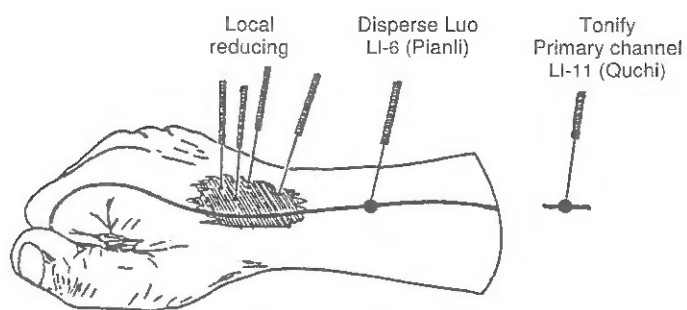


Figure 5.

Case 1: Treatment for Excess of the Tendinomuscular channel and Excess of Luo vessel of the Large Intestine

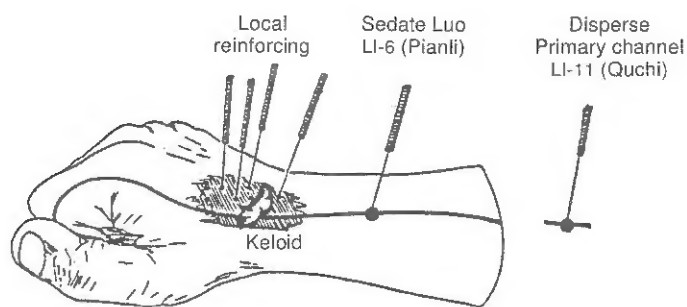


Figure 6.

Case 2: Treatment for Deficiency of the Tendinomuscular channel and Excess of Luo vessel of the Large Intestine

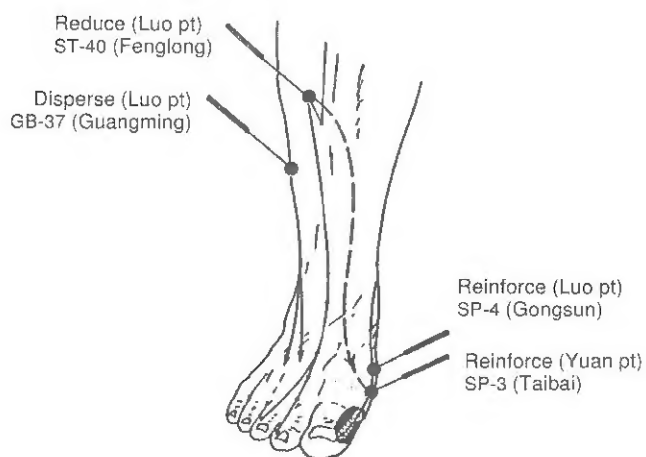


Figure 7.

Case 4: Treatment of a trophic ulcer of the big toe

Table 2.
Differential diagnosis of Luo vessels and Tendinomuscular channel disorders

Differential	Tendinomuscular Channels	Luo Vessels
Depth of disturbance(s)	<ul style="list-style-type: none"> -Superficial or relatively mild character of the disturbances; -With no symptoms of organ involvement 	<ul style="list-style-type: none"> -Disturbances may be both superficial and deep (serious), including psychological or mental disorders (for example, excess in the Stomach Luo)
Pain	<ul style="list-style-type: none"> -Usually Excess syndrome, but may also be Deficiency of tendinomuscular channel; -Usually accompanied by altered skin sensitivity and other inflammatory features, but without skin pattern alterations (such as scars or atrophy); -Relieved or aggravated by pressure 	<ul style="list-style-type: none"> -Usually Excess syndrome, but may also be Deficiency of Luo; -Pain is not accompanied by a change of skin sensitivity, although numbness and skin pattern alterations are possible; -Relieved or aggravated by movement
Skin Itch	<ul style="list-style-type: none"> -Relieved by light scratching; caused by Wei Qi deficiency 	<ul style="list-style-type: none"> -May cause vigorous scratching, often to the extent of drawing blood and leaving markings; caused by Blood and Qi deficiency
Treatment	<ul style="list-style-type: none"> -Local therapy of the affected area is required; -Acupuncture, moxibustion, massage, etc. 	<ul style="list-style-type: none"> -Local therapy is inefficient, Luo and Yuan points should usually be used; -Acupuncture, moxibustion and chiropractic is applicable

tal disorders and/or epilepsy," we propose that one might also find Blood stagnation in the venous system such as insufficient venous drainage from the brain and other organs of the head and neck.

Excess at the *distal* branch of the Gallbladder Luo (Yang), associated with symptoms of "coldness in the feet," might also present with arterial blockage such as insufficient arterial supply to the lower extremities due to atherosclerosis or thrombosis.

Excess syndromes involving the *proximal* branch of the Spleen Luo (Yin), associated with severe abdominal pain, might include arterial disorders, e.g., resembling symptoms found in thrombosis of the mesenteric artery.

And, excess at the distal branch of the Lung Luo (Yin), associated with "sensations

of heat in the wrist and palm," manifesting due to venous dilatation.

Certainly, we aren't suggesting that all syndromes of Excess are characterized by vascular disorders. Various symptoms are well known and reported.¹⁻⁵ Nevertheless, the above perspective shows some correspondence with traditional Chinese diagnosis and some aspects of modern Western medicine.

Expanding on this concept, the clinical applications begin to emerge. For example: "coldness in the feet" could be attributed not only to Excess of the Gallbladder (Yang) Luo, but also to Excess of the Stomach (Yang) or Bladder (Yang) Luo vessels.

Let's take these concepts one step further and consider a patient with a known Western diagnosis of hypertension involving

the pulmonary artery, i.e., pulmonary hypertension. Per our hypothesis, because this is an arterial disorder, there would be involvement of an Excess of the proximal branch of the Lung (Yin) Luo vessel. Accordingly, the Luo point of the Lung [Yin] channel (LU-7; Lieque) should be dispersed.

D. Deficiency Syndromes of the Luo Vessels

In the exhaustion phase of GAS, depleted stores of glucocorticoids prevent cells from obtaining extra sugar, nutrients and minerals they need to cope. These factors alter cellular metabolism, thus placing a greater load on the circulatory, GI, nervous, and immune systems; virtually every part of the body. As a result they predispose to various "trophic" disorders including muscular atrophy and weakness of the lower extremities (Stomach Luo), weak and flaccid muscles of the lower limbs and inability to stand from a sitting position (Gallbladder Luo), pruritus of the skin (Liver and Ren Luo vessels), abdominal symptoms including distention (Spleen Luo), and weakness in the joints of the extremities (Great Luo of the Spleen).²⁻⁵

One may attempt to differentiate Yang from Yin, SNS from PNS generated disorders (for example, dry or humid gangrene), but for practical application it is not necessary.

Trophic disorders of the skin can include the following: regional pruritus, neurodermatitis, eczema, bald spots, trophic ulcer, bedsores, etc. (Hyperplasia of the skin, including keloids, pertains to an Excess syndrome of the Luo traversing the affected region).

Trophic disorders of the musculature include weakness, partial or complete paralysis with muscular atrophy, torticollis, etc.

Trophic disorders of the joints include weakness, flaccidity, habitual dislocation, joint crepitus, slippage of vertebral body, etc.

Degeneration or atrophy of an organ or tissue also can be described as a Deficiency of the related Luo.

E. The Differential Diagnosis of Disorders Involving Luo Vessels & Tendinomuscular Channels

Excess or Deficiency syndromes of the Luo vessels and tendinomuscular channels may present with similar clinical manifestations. Therefore, differential diagnostics is required for these two groups of syndromes. We will consider only a few common symptoms, which one usually needs to differentiate (see Table 2).

To diagnose a particular case, in addition to the usual examinations (palpation of the peripheral pulse, observation of the color and pattern of the skin, etc.), the practitioner should also palpate the affected region and Luo point, plus observe other signs such as posture, flaccidity, flexion or extension of involved limbs or joints, etc.

II. Treatment

According to Jing-Luo theory, the therapeutic principle is to reduce an Excess and to increase a Deficiency. Generally, for either an Excess or Deficiency of a Luo, one should select the corresponding Luo point and treat accordingly.²

However, in practice, treatment must also address variations related to the source of the disturbance, that is, Exogenous and Endogenous factors.⁵

1) Exogenous Factors

Excess Syndrome: Disperse the Luo point of the affected channel.

Deficiency Syndrome: According to Nguyen Van Nghi, Exogenous factors accumulate at the Yuan-point of the affected (or aberrant) channel. This point should be dispersed. However, this dispersion also results in reducing the Luo point of the paired Yin-Yang channel. In order to preserve the

integrity of the (more normal) paired channel, its Luo point should be tonified.⁵

Certainly, if there are disorders within other systems or tissues, they will additionally need special treatment. For example, if there is Deficiency of the Luo of one side, the practitioner may be almost certain that there is a disorder at the Divergent channel on the other side.

2) Endogenous Factors

If Excess or Deficiency of the Luo is a result of deeper Excess or Deficiency at the Primary channel or at the Organ, it will be necessary to treat the Primary reason first, and then the Luo.

III. Clinical Examples

Case 1: Luo Vessel Excess

Symptoms: Contusion of the back of the wrist with pain and swelling. Pain aggravated by pressure and extension.

Diagnosis: Excess of the Tendinomuscular channel and Luo vessel of the Large Intestine.

Treatment: Disperse the affected region locally and Luo point of the Large Intestine, LI-6 (Pianli). Additionally, the Primary (Large Intestine) channel should be tonified via acupoint LI-11 (Quchi) (see Figure 5).

Case 2: Luo Vessel Excess

Symptoms: Contusion of the back of the wrist followed by formation of a keloid; chronic dull pain, relieved by local heat and massage, but aggravated by extension of the wrist. There was a loss of sensation and thinning in the vicinity of the scar, and the skin remained intact.

Diagnosis: Deficiency in the Large Intestine Tendinomuscular channel; Excess in the Luo of the Large Intestine channel.

Treatment: Locally tonify the Deficient area of the Large Intestine Tendinomus-

cular channel with moxibustion or acupuncture via superficial needling. Exogenous disturbances should be dispersed via the He ("Sea") point LI-11 (Quchi) of the Large Intestine Primary channel; sedation of the Large Intestine Luo should be done through the Luo point LI-6, (Pianli) (see Figure 6).

Comment: Injury is equivalent to transformation of "kinetic energy" into Heat Qi. Any moving body has kinetic energy, which correlates with its mass and speed. If this moving body is suddenly stopped, kinetic energy changes into heat/Heat, one of the Six Exogenous factors.

Case 3: Luo Vessel Deficiency and Excess

Symptoms: Patients with injury to the vertebral column may often have paralysis of the lower (and upper) extremities, bedsores at the sacral region, hyperkeratosis of the soles of the feet, constipation and retention of urine.

Diagnosis: Bedsores and paralysis due to Deficiency of the Bladder Luo and damage of Du and Dai Extra vessels; hyperkeratosis, genitourinary symptoms due to Excess of the Kidney Luo.

Treatment: To improve trophic processes in the paralyzed extremities, tonify the Yuan point of the Bladder channel (BL-64: Jinggu) and disperse the Luo point of the Kidney channel (K-4: Dazhong) to restore balance between Yin-Yang paired channels.

Case 4: Luo Vessel Deficiency and Excess

Symptoms: Ulcer of the large toe, cold feet and diabetes mellitus (Middle Jiao type).

Diagnosis: Ulceration of the large toe is a symptom of Spleen Luo Deficiency. However, cold feet indicate Excess of the Stomach or Gallbladder Luo vessels. Since there were no signs of Gallbladder channel disorders, one may suppose that there is an Excess of the Gallbladder Luo vessel, caused by

entry and lodging of the Exogenous factor, and/or blockage of the descending branch of the Chong Extra vessel.

This patient's other symptoms suggested a Deficiency of Yin (Kidney Yin), Excess of the Stomach (Organ), and Deficiency of the Spleen (Organ) as a result of imbalance between Yin-Yang related Organs and channels.

Treatment:

- a. Strengthen Yin by means of herbs and acupuncture.
- b. Harmonize the Stomach and Spleen: Reduce the Luo point of the Stomach (ST-40: Fenglong) and reinforce the Yuan point of the Spleen (SP-3: Taibai).
- c. Strengthen the Spleen Luo: Reinforce the Luo point of the Spleen (SP-4: Gongsun); this will also serve to resolve blockage of the descending branch of the Chong Mai. [Note: The Confluent point of the Chong Extra vessel and the Luo point of the Spleen are the same: Gongsun].
- d. Disperse the Gallbladder Luo: Disperse the Luo point of the Gallbladder (GB-37: Guangming). (see Figure 7)

IV. Conclusion

Certainly, it is not possible to consider all aspects of this vast subject, nevertheless we hope that this new perspective on the Luo system will enable practitioners to apply more effective treatments and to extend therapeutic horizons.

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